Main research interest

The Stochastic Operations Research group (Borst, Boxma) and the Stochastic Networks and Applied Probability group (Van Leeuwaarden) focus on complex systems that operate under randomness and uncertainty, and develop mathematical models and techniques for the analysis and optimization of such systems.

The results provide key insight in the design of resource management strategies and data-driven learning schemes to improve the performance of vital societal networks (internet, wireless networks, dimensioning of large-scale service systems, energy, smart road traffic, healthcare).

We are interested in exploiting the increasing availability of high-volume high-quality data to make better strategic, tactical and operational decisions.

Scientific staff

Prof. Onno Boxma
queueing theory, insurance risk, performance modelling

Prof. Sem Borst
performance analysis/optimization of computer- and communication networks

Dr. Marko Boon
performance of road traffic

Dr. Stella Kapodistria
energy networks, smart maintenance

Prof. Johan van Leeuwaarden
large-scale stochastic networks, applied probability

Dr. Jacques Resing
insurance risk, smart maintenance

Dr. Maria Vlasiou
layered networks, healthcare management

Prof. Bert Zwart
revenue management, energy networks, queueing theory

In about 5 PhD projects, there is a clear link to data science.

Success stories

MSc student Paul Krijger (Spyker Prize 2013 of Kivi) used TomTom floating car data to predict traffic light green-red cycles, with the ultimate goal to improve routing recommendations to drivers.

850 traffic light intersections in Portland (Oregon)

Project examples

1. DYNAFLOAT, Topsector Logistics
Optimization of road traffic

2. HSM (Healthcare Smart Maintenance), Datascience Flagship with Philips
Optimizing maintenance of medical equipment

3. NETWORKS, Zwaartekracht programme
Bringing together stochastics and algorithmics to model, understand, control and optimize large-scale networks; applications to traffic, communication, healthcare, service engineering and energy networks.

4. Services and flows in hospitals, project with Mandelbaum (using real hospital data from SEELab, Technion)
Real-time locating systems track the flow of both patients and providers in hospitals. Mathematical models describing these flows can detect bottlenecks, and assess the impact of routing and scheduling decisions to improve hospital design.